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SOLAR/1030-79/02

Monthly Performance Report

CHESTER WEST

FEBRUARY 1979

FEB 25 1980

U.S. Department of Energy

National Solar Heating and Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

CHESTER WEST

FEBRUARY 1979

I. SYSTEM DESCRIPTION

The Chester West site is a single-family residence in Huntsville, Alabama. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 225 square feet. The array faces south at an angle of 49 degrees to the horizontal. A glycerol-water solution is used as the medium for delivering solar energy from the collector array to storage, and water is the medium for delivering solar energy from storage to the space heating and hot water loads. Solar energy is stored aboveground in a 500-gallon water storage tank. Auxiliary space heating is provided by an air-to-air heat pump and electrical heating elements which are designed to function in parallel with the solar energy space heating loop. Auxiliary hot water heating is provided in series with the solar energy hot water heating loop through the use of electrical heating elements in an 80-gallon DHW tank. The system, shown schematically in Figure 1, has three modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the control system senses a sufficient temperature difference between the collector and storage and remains active until the temperature difference drops below the accepted minimum. The collected energy is transferred to storage through a ring-type, liquid-to-liquid heat exchanger located in the storage tank. Pump P1 is operating.

Mode 2 - Storage-to-Space Heating: This mode activates when there is a demand for space heating. Solar energy is circulated to the conditioned space by solar heated water from storage through a liquid-to-air heat exchanger located in the air-distribution duct. Pump P3 is operating.

Mode 3 - Storage-to-DHW Tank: This mode activates when the control system senses a sufficient temperature difference between storage and the DHW tank, and remains active as long as a sufficient difference exists. Water circulates from the top of storage through a liquid-to-liquid heat exchanger located in the bottom of the DHW tank. Pump P2 is operating.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was occupied during the month of February and the solar energy system operated continuously during the month. Solar energy satisfied 10 percent of the space heating requirements. In supporting the space heating requirements, the solar energy system provided electrical savings of 0.45 million Btu. The solar energy system also supported the DHW subsystem during the month. However,

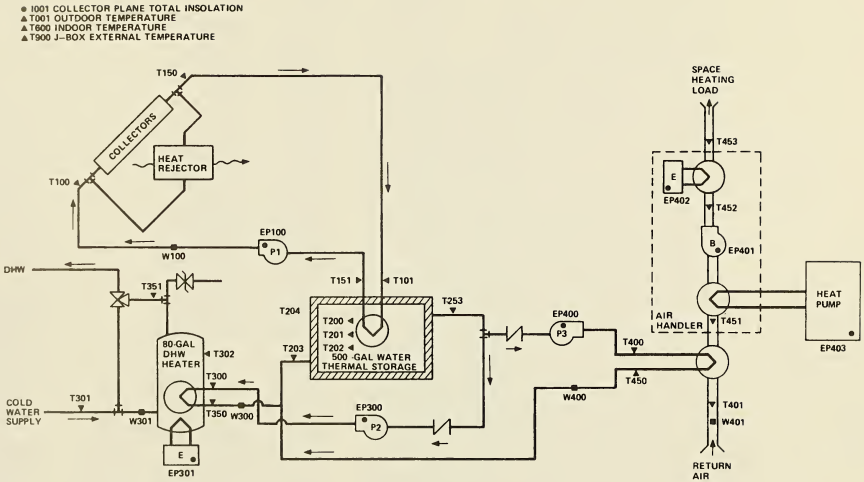

Figure 1. CHESTER WEST SOLAR ENERGY SYSTEM SCHEMATIC

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a problem with the sensor measuring the flow of solar-heated water from storage to the DHW subsystem produced invalid data. This problem invalidated many DHW subsystem and storage performance factors.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 5.5 million Btu for a daily average of 866 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during February of 1257 Btu per square foot for a south-facing plane with a tilt of 49 degrees to the horizontal. The average ambient temperature during February was 40°F as compared with the long-term average for February of 44°F. The number of heating degree-days for the month (based on a 65°F reference) was 701, as compared with the long-term average of 605.

THERMAL PERFORMANCE

System - During February the solar energy system performed somewhat poorer than expected. The expected performance was determined from a modified f-chart analysis using measured weather and subsystem loads as inputs. Solar energy collected was 2.2 million Btu versus an estimated 1.8 million Btu. Because of the missing DHW subsystem performance information, the following was based only on space heating subsystem loads. This would approximate system performance, since the space heating subsystem share of the load in February was over 96 percent of the total system load. Solar energy used by the space heating subsystem was estimated by assuming that all energy collected would be applied to the space heating subsystem load. Actual solar energy used by the space heating subsystem was 0.86 million Btu. The space heating solar fraction was 10 percent versus an estimated 21 percent.

Collector - The total incident solar radiation on the collector array for the month of February was 5.5 million Btu. During the period the collector loop was operating the total insolation amounted to 4.4 million Btu. The total collected solar energy for the month of February was 2.2 million Btu, resulting in a collector array efficiency of 41 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 2.1 million Btu. Energy loss during transfer from the collector array to storage was 0.1 million Btu. This loss represented 5 percent of the energy collected. Operating energy required by the collector loop was 0.16 million Btu.

Storage - Solar energy delivered to storage was 2.1 million Btu. There were 0.86 million Btu delivered from storage to the space heating subsystem. The average storage temperature for the month was 89°F.

DHW Load - The DHW subsystem consumed an unknown amount of solar energy and 0.52 million Btu of auxiliary electrical energy to satisfy a hot water load of 0.33 million Btu. The DHW subsystem consumed a total of 0.17 million Btu of operating energy. A daily average of 16 gallons of DHW was consumed at an average temperature of 140°F delivered from the tank.

Space Heating Load - Ten percent of the 8.6 million Btu space heating load was satisfied by 0.86 million Btu of solar energy. An auxiliary electrical heat pump and resistance heater used 8.0 million Btu of electrical fuel to satisfy the remaining 7.7 million Btu space heating load. This auxiliary requirement indicated a heat pump operating below its optimum performance level. The space heating subsystem consumed a total of 0.49 million Btu of operating energy, resulting in an electrical energy savings of 0.45 million Btu.

OBSERVATIONS

Problems existed with liquid flow sensors in both the DHW and space heating loops. In the latter case, a fall-back position to the air side of the space heating subsystem was possible; however, a work-around was not possible for the DHW subsystem. Therefore, many DHW and storage performance factors were invalidated. Additional anomalies in the DHW subsystem should be noted. The DHW loop pump tended to stay on too long and resulted in some energy being removed from the DHW subsystem and returned to storage. The amount was unmeasured but believed to be small. Also, there was a slight water seepage from the storage tank.

ENERGY SAVINGS

The space heating subsystem contributed an electrical energy savings of 0.45 million Btu.

III. ACTION STATUS

A new storage tank is to be installed in March by the grantee. Flow sensor operation in the DHW and space heating loop is to be investigated during the next site visit by Boeing. The system designer is investigating pump operation in the DHW loop.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: CHESTER WEST
REPORT PERIOD: FEBRUARY,1979

SOLAR/1030-79/02

SITE/SYSTEM DESCRIPTION:
THE CHESTER WEST SITE IS A THREE-BEDROOM TWO-STORY SINGLE FAMILY DWELLING OF APPROXIMATELY 2300 SQUARE FEET OF LIVING AREA. THE SOLAR SYSTEM USES ROOF MOUNTED FLAT PLATE COLLECTORS. A MIXTURE OF ANTIFREEZE AND WATER SERVES AS THE COLLECTOR-TO-STORAGE HEAT TRANSPORT FLUID. HEAT STORAGE IS A 500 GALLON TANK OF WATER LOCATED IN THE GARAGE. THE SOLAR SYSTEM SERVICES DHW PREHEAT AND SPACE HEATING NEEDS OF THE DWELLING FROM STORAGE ONLY. AUXILIARY SPACE HEATING IS PROVIDED BY A HEAT PUMP AND RESISTANCE HEATING COMBINATION.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	5.456	MILLION BTU
	24248	BTU/SQ.FT.
COLLECTED SOLAR ENERGY	2.210	MILLION BTU
	9824	BTU/SQ.FT.
AVERAGE AMBIENT TEMPERATURE	40	DEGREES F
AVERAGE BUILDING TEMPERATURE	68	DEGREES F
ECSS SOLAR CONVERSION EFFICIENCY	*	
ECSS OPERATING ENERGY	0.157	MILLION BTU
TOTAL SYSTEM OPERATING ENERGY	0.810	MILLION BTU
TOTAL ENERGY CONSUMED	11.552	MILLION BTU

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	0.327	8.625	N.A.	8.952 MILLION BTU
SOLAR FRACTION	*	10	N.A.	* PERCENT
SOLAR ENERGY USED	*	0.855	N.A.	* MILLION BTU
OPERATING ENERGY	0.160	0.485	N.A.	0.810 MILLION BTU
AUX. THERMAL ENERGY	0.516	7.879	N.A.	8.395 MILLION BTU
AUX. ELECTRIC FUEL	0.516	8.015	N.A.	8.531 MILLION BTU
AUX. FOSSIL FUEL	N.A.	N.A.	N.A.	N.A. MILLION BTU
ELECTRICAL SAVINGS	*	0.460	N.A.	* MILLION BTU
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A. MILLION BTU

SYSTEM PERFORMANCE FACTOR: 0.288

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: CHESTER WEST
REPORT PERIOD: FEBRUARY,1979

SOLAR/1030-79/02

SITE/SYSTEM DESCRIPTION:
THE CHESTER WEST SITE IS A THREE-BEDROOM TWO-STORY SINGLE FAMILY DWELLING OF APPROXIMATELY 2300 SQUARE FEET OF LIVING AREA. THE SOLAR SYSTEM USES ROOF MOUNTED FLAT PLATE COLLECTORS. A MIXTURE OF ANTIFREEZE AND WATER SERVES AS THE COLLECTOR-TO-STORAGE HEAT TRANSPORT FLUID. HEAT STORAGE IS A 500 GALLON TANK OF WATER LOCATED IN THE GARAGE. THE SOLAR SYSTEM SERVICES DHW PREHEAT AND SPACE HEATING NEEDS OF THE DWELLING FROM STORAGE ONLY. AUXILIARY SPACE HEATING IS PROVIDED BY A HEAT PUMP AND RESISTANCE HEATING COMBINATION.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	5.756 GIGA JOULES 275257 KJ/SQ.M.
COLLECTED SOLAR ENERGY	2.332 GIGA JOULES 111562 KJ/SQ.M.
AVERAGE AMBIENT TEMPERATURE	4 DEGREES C
AVERAGE BUILDING TEMPERATURE	22 DEGREES C
FOSS SOLAR CONVERSION EFFICIENCY	N.A.
FOSS OPERATING ENERGY	0.165 GIGA JOULES
TOTAL SYSTEM OPERATING ENERGY	0.855 GIGA JOULES
TOTAL ENERGY CONSUMED	12.188 GIGA JOULES

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	0.345	9.099	N.A.	9.444 GIGA JOULES
SOLAR FRACTION	*	.10	N.A.	* PERCENT
SOLAR ENERGY USED	*	0.903	N.A.	* GIGA JOULES
OPERATING ENERGY	0.178	0.512	N.A.	0.855 GIGA JOULES
AUX. THERMAL ENG	0.544	8.312	N.A.	8.856 GIGA JOULES
AUX. ELECTRIC FUEL	0.544	8.456	N.A.	8.221 GIGA JOULES
AUX. FOSSIL FUEL	N.A.	N.A.	N.A.	N.A. GIGA JOULES
ELECTRICAL SAVINGS	*	0.475	N.A.	* GIGA JOULES
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A. GIGA JOULES

SYSTEM PERFORMANCE FACTOR: 0.289

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1979. SOLAR/0004-79/18

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: CHESTER WEST
REPORT PERIOD: FEBRUARY, 1979

SOLAR/1030-78/02

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	0.474	21	*	N	0.012	N	*
2	0.104	29	*	O	0.005	O	*
3	0.013	37	*	T	0.000	T	*
4	0.311	37	*		0.010		*
5	0.090	20	*	A	0.001	A	*
6	0.025	34	*	P	0.000	P	*
7	0.020	35	*	P	0.000	P	*
8	0.203	35	*	L	0.008	L	*
9	0.466	19	*	I	0.011	I	*
10	0.504	26	*	C	0.013	C	*
11	0.402	36	*	A	0.013	A	*
12	0.028	45	*	B	0.000	B	*
13	0.403	40	*	L	0.012	L	*
14	0.005	54	*	E	0.003	E	*
15	0.193	61	*		0.008		*
16	0.034	38	*		0.000		*
17	0.044	32	*		0.000		*
18	0.034	31	*		0.000		*
19	0.470	31	*		0.013		*
20	0.131	41	*		0.003		*
21	0.182	53	*		0.008		*
22	0.134	59	*		0.005		*
23	0.085	64	*		0.004		*
24	0.073	62	*		0.002		*
25	0.013	42	*		0.000		*
26	0.082	34	*		0.002		*
27	0.377	41	*		0.013		*
28	0.277	52	*		0.010		*
SUM	5.456	-	*	N.A.	0.157	N.A.	-
AVG	0.195	40	*	N.A.	0.006	N.A.	*
NBS ID	0001	N113			0102		N111

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTOR ARRAY PERFORMANCE

SITE: CHESTER WEST
REPORT PERIOD: FEBRUARY,1978

SOLAR/1030-78/02

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.474	0.435	0.223	27	0.470
2	0.194	0.109	0.052	35	0.270
3	0.013	0.000	0.000	38	0.000
4	0.311	0.278	0.141	42	0.452
5	0.090	0.013	0.005	30	0.056
6	0.025	0.000	0.000	33	0.000
7	0.020	0.000	0.000	36	0.000
8	0.203	0.162	0.081	30	0.398
9	0.466	0.412	0.195	21	0.418
10	0.504	0.468	0.235	37	0.467
11	0.492	0.462	0.240	50	0.487
12	0.028	0.000	0.000	52	0.000
13	0.403	0.377	0.188	47	0.468
14	0.095	0.048	0.026	58	0.278
15	0.193	0.165	0.081	65	0.421
16	0.034	0.000	0.000	36	0.000
17	0.044	0.000	0.000	35	0.000
18	0.034	0.000	0.000	30	0.000
19	0.479	0.456	0.240	35	0.501
20	0.131	0.043	0.020	46	0.148
21	0.182	0.151	0.076	56	0.420
22	0.134	0.092	0.044	61	0.330
23	0.085	0.050	0.025	66	0.290
24	0.073	0.015	0.008	65	0.108
25	0.013	0.000	0.000	38	0.000
26	0.082	0.036	0.017	33	0.203
27	0.377	0.345	0.175	51	0.464
28	0.277	0.252	0.128	58	0.463
SUM	5.456	4.369	2.210	-	-
AVG	0.195	0.156	0.079	44	0.405
NBSIO	0001		0100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STORAGE PERFORMANCE

SITE: CHESTER WEST
REPORT PERIOD: FEBRUARY,1979

SOLAR/1030-79/32

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.209	*	0.000	90	*
2	0.048	*	0.037	88	*
3	0.000	*	-0.026	88	*
4	0.132	*	0.000	92	*
5	0.004	*	-0.016	82	*
6	0.000	*	-0.015	76	*
7	0.000	*	-0.011	76	*
8	0.074	*	0.055	82	*
9	0.184	*	-0.032	92	*
10	0.221	*	0.056	97	*
11	0.227	*	0.083	103	*
12	0.000	*	-0.136	87	*
13	0.188	*	0.095	97	*
14	0.025	*	-0.068	88	*
15	0.075	*	0.051	95	*
16	0.000	*	-0.086	80	*
17	0.000	*	-0.013	77	*
18	0.000	*	-0.022	74	*
19	0.230	*	0.086	91	*
20	0.017	*	-0.031	85	*
21	0.073	*	0.051	90	*
22	0.042	*	-0.014	92	*
23	0.023	*	0.010	95	*
24	0.006	*	-0.014	95	*
25	0.000	*	-0.034	89	*
26	0.015	*	0.002	84	*
27	0.162	*	0.078	96	*
28	0.124	*	-0.010	96	*
SUM	2.081	*	0.070	-	-
AVG	0.074	*	0.002	89	*
NAS ID	Q200	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.
0 DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: CHESTER WEST
REPORT PERIOD: FEBRUARY,1979

SOLAR/1030-79/02

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR.OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.011	*	*	0.008	0.018	0.018	N	*	N	50	140	14
2	0.000	*	*	0.005	0.011	0.011	O	*	O	52	140	0
3	0.014	*	*	0.004	0.018	0.018	T	*	T	55	140	19
4	0.029	*	*	0.009	0.027	0.027		*		56	140	36
5	0.009	*	*	0.009	0.019	0.019	A	*	A	56	140	12
6	0.013	*	*	0.004	0.021	0.021	P	*	P	53	140	18
7	0.003	*	*	0.001	0.015	0.015	P	*	P	54	140	3
8	0.008	*	*	0.004	0.017	0.017	L	*	L	55	140	10
9	0.000	*	*	0.005	0.013	0.013	I	*	I	50	140	0
10	0.014	*	*	0.011	0.015	0.015	C	*	C	53	140	19
11	0.015	*	*	0.012	0.014	0.014	A	*	A	59	140	22
12	0.005	*	*	0.012	0.012	0.012	B	*	B	61	140	7
13	0.025	*	*	0.012	0.028	0.028	L	*	L	59	140	33
14	0.003	*	*	0.009	0.011	0.011	E	*	E	63	140	5
15	0.011	*	*	0.003	0.015	0.015		*		67	140	14
16	0.023	*	*	0.007	0.023	0.023		*		59	140	31
17	0.019	*	*	0.008	0.027	0.027		*		54	140	26
18	0.062	*	*	0.005	0.069	0.069		*		50	140	80
19	0.002	*	*	0.007	0.015	0.015		*		55	140	3
20	0.007	*	*	0.011	0.013	0.013		*		53	140	0
21	0.001	*	*	0.004	0.015	0.015		*		61	140	2
22	0.002	*	*	0.000	0.010	0.010		*		67	140	2
23	0.000	*	*	0.000	0.011	0.011		*		69	140	0
24	0.011	*	*	0.002	0.014	0.014		*		69	140	16
25	0.008	*	*	0.002	0.012	0.012		*		64	140	9
26	0.003	*	*	0.000	0.012	0.012		*		54	140	4
27	0.033	*	*	0.007	0.029	0.029		*		59	140	44
28	0.006	*	*	0.008	0.011	0.011		*		61	140	8
SUM	0.327	-	*	0.169	0.516	0.516	N.A.	*	N.A.	-	-	443
AVG	0.012	*	*	0.006	0.018	0.018	N.A.	*	N.A.	58	140	16
NBS	0302	N300	0300	0303	0301	0305	0306	0311	0313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
0 DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: CHESTER WEST
REPORT PERIOD: FEBRUARY,1979

SOLAR/1030-79/02

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.507	21	0.106	0.040	0.416	0.442	N	0.067	N	68	31
2	0.634	0	0.000	0.024	0.541	0.550	O	0.000	O	67	30
3	0.451	0	0.000	0.019	0.464	0.476	T	0.000	T	68	37
4	0.284	22	0.061	0.020	0.225	0.230		0.028		68	37
5	0.511	1	0.006	0.025	0.516	0.528	A	0.003	A	67	30
6	0.551	0	0.000	0.024	0.567	0.581	D	0.000	D	68	34
7	0.460	0	0.000	0.019	0.465	0.474	D	0.000	D	67	35
8	0.359	0	0.000	0.016	0.363	0.370	L	0.000	L	67	35
9	0.602	20	0.120	0.038	0.493	0.505	I	0.094	I	65	10
10	0.385	19	0.074	0.022	0.314	0.322	C	0.045	C	66	26
11	0.233	29	0.067	0.018	0.168	0.172	A	0.036	A	68	36
12	0.198	38	0.075	0.019	0.124	0.129	R	0.031	R	66	45
13	0.216	12	0.027	0.013	0.194	0.198	L	0.011	L	67	40
14	0.000	66	0.058	0.014	0.032	0.033	E	0.022	E	68	54
15	0.025	0	0.000	0.001	0.026	0.026		0.000		70	41
16	0.289	15	0.044	0.018	0.247	0.252		0.020		67	38
17	0.553	0	0.000	0.024	0.568	0.567		0.000		68	32
18	0.536	0	0.000	0.022	0.536	0.536		0.000		68	31
19	0.265	24	0.064	0.018	0.200	0.200		0.037		68	31
20	0.386	7	0.027	0.022	0.359	0.359		0.014		67	41
21	0.116	5	0.006	0.007	0.109	0.109		0.002		68	53
22	0.024	100	0.024	0.005	0.000	0.000		0.008		68	50
23	0.000	0	0.000	0.000	0.000	0.000		0.000		70	64
24	0.000	0	0.000	0.000	0.000	0.000		0.000		70	62
25	0.250	7	0.017	0.013	0.233	0.233		0.007		68	42
26	0.494	0	0.000	0.020	0.494	0.494		0.000		67	34
27	0.204	10	0.021	0.010	0.183	0.183		0.006		68	41
28	0.103	56	0.058	0.014	0.045	0.045		0.022		68	52
SUM	8.625	-	0.855	0.485	7.879	8.015	N.A.	0.450	N.A.	-	-
AVG	0.308	10	0.031	0.017	0.281	0.286	N.A.	0.016	N.A.	68	40
NBS	0402	N400	0400	0403	0401		0410	0415	0417	N406	N113

* DENOTES UNAVAILABLE DATA.
Ø DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

4258

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE: CHESTER WEST
REPORT PERIOD: FEBRUARY,1979

SOLAR/1030-79/02

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	2106	N	21	27	N	N	N
2	851	O	29	35	O	O	O
3	59	T	27	38	T	T	T
4	1384		37	42			
5	402	A	29	30	A	A	A
6	111	P	34	33	P	P	P
7	88	P	35	36	P	P	P
8	902	L	35	39	L	L	L
9	2070	I	19	21	I	I	I
10	2230	C	26	37	C	C	C
11	2188	A	36	50	A	A	A
12	123	B	45	52	B	B	B
13	1791	L	40	47	L	L	L
14	421	E	54	58	E	E	E
15	857		61	65			
16	153		28	36			
17	194		32	35			
18	151		21	30			
19	2129		31	35			
20	582		41	46			
21	809		52	56			
22	597		56	61			
23	378		64	66			
24	323		62	65			
25	57		42	38			
26	365		34	33			
27	1675		41	51			
28	1223		52	58			
SUM	24248	N.A.	-	-	-	-	-
AVG	866	N.A.	40	44	N.A.	N.A.	N.A.
NBS ID	0001		N113			N115	N114

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